PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Develop Research Priorities For Fall Chinook In The Columbia River Basin

BPA project number: 20149
Contract renewal date (mm/yyyy): ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Pacific Northwest National Laboratory

Business acronym (if appropriate) PNNL

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses
2.2A, 6.1C, 7.0D, 7.1C, 7.1F, 7.3, 7.5B.3, 7.6

FWS/NMFS Biological Opinion Number(s) which this project addresses
None

Other planning document references
Our study is designed to identify research opportunities that protect and enhance naturally spawning anadromous fish populations and their habitats in the mainstem Columbia River, an objective consistent with many planning documents:
• The Snake River Recovery Plan (Section 1.4 and 2.11; Measure 4.1.d and 4.7)
• Wy Kan Ush Me Wa Kush Wi (Artificial Production Actions for the Snake River Mainstem Action 8)
• "Return to the River" (ISG 1996) emphasized the Hanford Reach of the Columbia River as a model of metapopulation dynamics and study area for "normative" river reaches. They also discussed the importance of alluvial mainstem reaches and importance of core populations to system production
• The ISRP FY99 review of the Fish and Wildlife Program recommended further work on naturally reproducing salmon populations (Recommendation V-B.2.b.2) and in their comments on proposals specifically outlined the need for a fall chinook synthesis and coordination "umbrella" proposal (Appendix A).

Short description
Conduct a synthesis of ongoing and planned fall chinook salmon research, examine the factors that have resulted in successful fall chinook populations (i.e., Hanford Reach) and apply this knowledge to other locations in the Columbia Basin.

Target species
Fall chinook salmon (Oncorhynchus tshawytscha)

Section 2. Sorting and evaluation

Subbasin
Systemwide

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☒ Anadromous fish ☐ Resident fish ☐ Wildlife	☐ Multi-year (milestone-based evaluation) ☐ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☐ Operation & maintenance ☐ New construction ☒ Research & monitoring ☐ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20541	Snake River fall chinook salmon studies/Umbrella Proposal
9105	Determine if salmon are successfully spawning below lower Columbia main st…
9131	Evaluate fall chinook and chum spawing, production, and habitat use in the…
9102900	Life history and survival of fall chinook salmon in Columbia River basin
9403400	Assessing summer and fall chinook salmon restoration in the Snake River ba…
9406900	A spawning habitat model to aid recovery plans for Snake River fall chinook
9603301	Supplement and enhance the two existing stocks of Yakima R. fall chinook
9701400	Evaluation of juvenile fall chinook stranding on the Hanford Reach
9801003	Monitor and evaluate the spawning distribution of Snake River fall chinook…
9801004	Monitor and evaluate yearling Snake River fall chinook released upstream o…
	Assessment of the impacts of development and operation of the Columbia Riv…

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Develop the conceptual research framework for fall chinook salmon	a	Conduct interviews with staff from the Council, ISAB, CBFWA, and BPA
		b	Conduct a regional workshop with principal investigators involved in fall chinook salmon research
2	Synthesize current information on fall chinook salmon populations	a	Compile and integrate existing information on fall chinook salmon, with emphasis on management actions influencing the success and/or demise of Columbia River system populations
3	Develop a research compendium consistent with an ecosytem approach and natural production objectives	a	Conduct a second regional workshop to present synthesis results, identify information gaps, and prioritize research opportunities
		b	Produce a comprehensive planning document as a reference for regional decision-making

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	10/1999	1/2000		Interviews completed 31 Dec; workshop completed 31 Jan	40.00%
2	1/2000	5/2000		Draft synthesis document completed 30 Apr	20.00%
3	6/2000	9/2000		Second workshop completed 30 Jun; final report completed 30 Sep	40.00%
				Total	100.00%

Schedule constraints
Coordination of researcher availability

Completion date
30 September, 2000

Section 5. Budget

FY99 project budget (BPA obligated):

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%45	31,782
Fringe benefits		%9	5,962
Supplies, materials, non-expendable property		%0	0
Operations & maintenance		%0	0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	0
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags:	%0	0
Travel		%7	5,087
Indirect costs		%13	9,313
Subcontractor	Workshop meeting room expenses and reimbursement of travel costs (non-labor) for participants	%25	17,486
Other	Duplicating	%1	450
		TOTAL BPA FY2000 BUDGET REQUEST	$70,080

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
		%0	
		%0	
		%0	
		%0	
		Total project cost (including BPA portion)	$70,080

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget				

Section 6. References

Watershed?	Reference
☐	Dauble DD, and DG Watson. 1997. Status of fall chinook salmon populations in the mid-Columbia River, 1948-1992. North American Journal of Fisheries Management 17:283-300.
☐	Fulton LA. 1968. Spawning areas and abundance of chinook salmon (Oncorhynchus tshawytscha) in the Columbia River basin--past and present. U.S. Fish and Wildlife Service Spec. Sci. Rep. Fish. No. 571.
☐	Geist DR, and DD Dauble. 1998. Redd site selection and spawning habitat use by fall chinook salmon: the importance of geomorphic features in large rivers. Environmental Management 22:655-669.
☐	Gilbert CH, and BW Evermann. 1892. A report upon investigations in the Columbia River basins, with descriptions of four new species of fish. Bull. U.S. Fish Commission 14:169-

	207.
☐	Giorgi AE. 1992. Fall chinook salmon spawning in Rocky Reach pool: effects of a three foot increase in pool elevation. Research report to Chelan County Public Utility District, Wenatchee, Washington.
☐	Horner N, and TC Bjornn. 1979. Status of upper Columbia River fall chinook salmon (excluding Snake River populations). U.S. Fish and Wildlife Service, Moscow, Idaho.
☐	Hymer J. 1997. Results of Studies on Chinook Spawning in the Main Stem Columbia River below Bonneville Dam. WDFW Progress Report #97-9. Washington Department of Fish and Wildlife, Battle Ground, Washington.
☐	Huntington C, W Nehlsen, and J Bowers. 1996. A survey of healthy native stocks of anadromous salmonids in the Pacific Northwest and California. Fisheries 21(3):6-14.
☐	Independent Scientific Groups (ISG). 1996. Return to the river, restoration of salmonid fishes in the Columbia Riber ecosystem. Pre-publication copy dated September 10, 1996. Northwest Power Planning Council, Portland, Oregon.
☐	Independent Science Review Panel (ISRP). 1998. Review of the Columbia River Basin Fish and Wildlife Program for fiscal year 1999 as directed by the 1996 ammendment to the NW Power Act. Northwest Power Planning Council, Portland, Oregon.
☐	Rogers LE, PA Beedlow, LE Eberhardt, DD Dauble, and RE Fitzner. 1988. Ecological baseline study of the Yakima firing center proposed land acquisition A status report. PNL-6485. Pacific Northwest National Laboratory, Richland, Washington.
☐	Van Hyning JM. 1969. Factors affecting the abundance of fall chinook salmon in the Columbia River. Fish. Bull. 4:1-83.
☐	
☐	

PART II - NARRATIVE

Section 7. Abstract

We propose to conduct a synthesis of ongoing and planned research on fall chinook salmon, examine the factors (e.g., supplementation, flow management practices, habitat protection) that have resulted in successful populations (i.e., Hanford Reach) and apply this knowledge to other locations in the Columbia Basin. We will develop a conceptual approach based on interviews with fisheries managers, program planners, and key researchers. We will synthesize information from all fall chinook salmon research being conducted in the Columbia River basin, including projects supported by BPA, U.S. Army Corps of Engineers, U.S. Department of Energy, Pacific Salmon Treaty, and others. Our synopsis will describe key linkages and interdependencies among projects. A workshop forum will be used to communicate results. The overall approach will address regional goals and will encompass an ecosystem approach. The final report from this project will provide fisheries managers, resource planners, and researchers with information needed to evaluate restoration and recovery options for fall chinook salmon.

Section 8. Project description

a. Technical and/or scientific background

Historic spawning areas for fall chinook salmon (*Oncorhynchus tshawytscha*) in the Columbia River basin once ranged from the mainstem Columbia River near The Dalles, Oregon upstream to the confluence of the Pend Oreille and Kootenai rivers in British Columbia (Fulton 1968; Dauble and Watson 1997). Snake River populations occurred from the mouth upstream to Shoshone Falls, Idaho (Gilbert and Evermann 1892; Fulton 1968). Overall, their combined mainstem spawning and rearing habitats covered a distance of almost 2500 km. Construction of an extensive network of hydroelectric dams between 1939 and 1975 blocked access or inundated more than 75% of their habitats in the Columbia River system (Van Hyning 1969; Horner and Bjornn 1979; Dauble and Watson 1997). The two primary mainstem production areas

for upriver fall chinook salmon are the Hanford Reach of the Columbia River (river km 549-639) and the Hells Canyon Reach of the Snake River (river km 240-398). In the mid-Columbia River, other minor spawning sites occur in tailwater sites immediately downstream of Wanapum (Rogers et al 1988; Horner and Bjornn 1979), Rock Island (Horner and Bjornn 1979), Wells dams (Giorgi 1992). Tailwater spawning has also been recently documented downstream of the four lower Snake River dams (Dauble, et al., in press) and Bonneville Dam (Hymer 1997). Fall chinook salmon also spawn in several large tributaries to the Columbia River system, including the Clearwater, Yakima, Deschutes, and Lewis rivers. Consequently, their life history constraints are complex, and information on ecosystem-level processes influencing their status has not been compiled.

Fall chinook salmon projects within the Fish and Wildlife Program cover a myriad of topics ranging from habitat characterization (9131, 9406900, 9102900), adult monitoring (9131, 9801003, 9403400), juvenile rearing and migration (981004, 9701400, 9403400, 9131, 9102900) and supplementation (9801004, 9603301). The overall goals of each project are different because they are geographically separate, agency jurisdiction varies, and environmental issues leading to their inception are different. Despite these differences, there have been recent attempts to coordinate research activities (e.g., Fall Chinook Coordination Group, Snake River). However, the number of projects have increased to the point that informal yearly meetings are insufficient to develop long-term planning objectives for the entire Columbia River basin. In addition, several of the projects listed in Section 3 of this proposal were initiated in the last 2 years. Thus, much of the planned research is incomplete and largely unreported.

One recent project (9406900) in the Hanford Reach involves development of an alternative view of fall chinook salmon spawning habitat (Geist and Dauble 1998), with intent to apply this knowledge to restoration of Snake River fall chinook salmon populations. This attempt is noteworthy because the Hanford Reach population was recently designated as one of 99 “healthy native stocks” of salmon and steelhead in the Pacific Northwest and California and one of 20 stocks considered to be at least two-thirds as abundant as would be expected in the absence of human impacts (Huntington et al. 1996). Concern over the status of Snake River stocks led to their listing as endangered under the Endangered Species Act in 1994 and planning for rebuilding these stocks is currently underway (NMFS 1995). Establishing additional linkages and applying “lessons learned” from successful management programs to other projects in the basin is essential to meeting overall program objectives for fall chinook salmon.

Extensive hydroelectric development and associated changes in available lotic habitat have likely reduced the production potential of the Columbia River watershed for fall chinook salmon. Therefore, future rebuilding strategies need to consider characteristics required for successful production within the context of remaining habitat features and human activities. It is particularly important that we develop more efficient means of communicating what we know about life history requirements and production constraints. This project will provide the necessary first step for developing an ecosystem-based approach for enhancement and recovery of fall chinook salmon populations in the Columbia River system.

b. Rationale and significance to Regional Programs

The proposed project will integrate existing knowledge on biotic and abiotic factors influencing the distribution and abundance of fall chinook salmon populations in the Columbia River basin. Specifically, it will provide a conceptual framework for fall chinook salmon research, consistent with an ecosystem approach recommended by the ISG (1996) and other regional planning documents. This project will increase the efficiency of regional programs directed at enhancement and restoration of fall chinook salmon populations. It specifically addresses several measures in the Fish and Wildlife Program, including: Measure 7.0D. Comprehensive environmental analysis of federal production activities; Measure 7.1C. Collection of population status, life history, and other data on wild and naturally spawning populations; and Measure 7.1F. System-wide and cumulative impacts of existing and proposed artificial production projects.

This project also addresses recommendations made by the ISRP. For example, the ISRP (1998) noted a, “general lack of concern with protection and enhancement of successful populations of salmonids, including populations using mainstem spawning and rearing habitat.” ISRP Recommendation V-B2.b.2 suggested, “that the council place more emphasis on protection and ways to enhance habitat of the naturally reproducing salmon populations in the mainstem of the Columbia River.” Finally, the ISRP, in their

comments on FY99 proposals, repeatedly used the statement, "…fall chinook should be considered as a part of a broader effort with an overall umbrella proposal that explains the relationships of and need for all subcomponents."

c. Relationships to other projects

This project will benefit from and enhance efforts to develop an "umbrella" project for ongoing Snake River fall chinook salmon research. Projects currently planned to be included under this umbrella include 9102900, 9302900, 9403400, 9810103, 980101004, and 9801005. While the focus of most Snake River research is on restoration and enhancement, our integration and synthesis will include other regional objectives.
In addition, our proposed will also involve the integration of data involving fall chinook salmon research projects conducted in other parts of the Columbia River basin including those funded by the U.S. Department of Energy (e.g.., Hanford Reach spawning surveys, Advanced Turbine Design Program), U.S. Army Corps of Engineers (e.g., tailrace spawning habitat, drawdown analysis), as well as studies conducted by private utilities. Currently, there is a lack of awareness of long-term objectives and interdependencies among these projects. This communication barrier often results in redundancy, information gaps, and general lack of coordination towards development of long-term research objectives. Our proposed project will provide for efficient transfer of information from all regional projects, allow technology transfer, and provide needed synergy at a time when resources are increasingly limited.

Our planned efforts are dependent upon researchers in current projects to provide a summary of their overall study design, critical uncertainties, and expected results. The proposed synthesis project will identify key linkages among these projects and long-term objectives of BPA Fish and Wildlife Program, and other regional planning documents. In this sense, our proposal will integrate management objectives for fall chinook salmon and address how ecosystem processes influence the success of remaining populations.

d. Project history (for ongoing projects)

N/A

e. Proposal objectives

There are three measurable objectives for this Project:

• Develop a conceptual framework for research of fall chinook salmon
• Synthesize ongoing and planned research on fall chinook salmon populations in the Columbia River basin
• Develop a comprehensive planning document consistent with an ecosystem approach and natural production objectives.

f. Methods

The approach to accomplishing our stated objectives includes three tasks:

Task 1. Develop conceptual framework

The expected product from this task is a draft document describing the conceptual framework for fall chinook salmon research. This approach will build upon restoration guidelines described by the ISG (1996). Specific activities include:

Subtask 1a. Interview managers and program planners - Telephone and personal interviews will be conducted with staff from the NW Power Planning Council, ISAB, ISRP, BPA, NMFS, CBFWA, WDFW, ODFW, and Tribes to clarify their perspective on regional goals directed at fall chinook salmon management and enhancement. Principal topics to be addressed will include ecosystem perspective, natural production goals, system operations, supplementation, and regulatory drivers. This workshop

would provide the political sideboards necessary for creating the conceptual framework. We plan to conduct these interviews during the first quarter of FY2000.

Subtask 1b. Conduct regional workshop with key researchers - A 2-day workshop will be conducted at a central location (e.g. Pasco, Washington) with fisheries biologists currently conducting research in the Columbia River Basin. The workshop is expected to be limited to approximately 25 participants. This number is based on our knowledge of the number of projects in the region, workshop logistics (e.g., size of meeting rooms, cost), and dynamics of the workshop process. We plan to hold this workshop in February 2000 or between field seasons for most researchers. The planned agenda will include: review of Project objectives and schedule, description of programmatic goals (based largely from findings of Subtask 1a), summary of principal results from researchers, and identification of key project linkages. All investigators currently conducting research in the basin on fall chinook salmon will be invited to this workshop.

Task 2. Synthesize current information

The expected product from this task is a draft synthesis document that summarizes current research conducted on fall chinook salmon.

We will compile, review, and synthesize information from all fall chinook salmon research being conducted in the Columbia River basin, including projects supported by BPA, U.S. Army Corps of Engineers, U.S. Department of Energy, Pacific Salmon Treaty, and those supported by internal agency funds, i.e., federal, state, Tribal agencies and private utilities. We will provide a synopsis of each project that includes: funding agency, duration of study, agency and individuals conducting the work, geographic extent of study, objectives/scope, critical uncertainties, innovative technologies, and past or expected products. This synopsis (and information provided in Task 1) will provide the basis for identifying key linkages and interdependencies among projects.

Task 3. Develop a comprehensive planning document

The expected product from this task is the final deliverable for the project. Two subtasks are proposed to provide the information required to meet the overall project objective.

Subtask 3a. Identify research needs - A 1-day follow-up workshop will be conducted at a central location in the early summer 2000. To facilitate efficient use of participant time, our project synopsis document will be provided to invitees for their review approximately 1 month prior to that meeting. Initial agenda items will include a brief review of the conceptual framework and a discussion of synthesis results. The workshop process will then focus on identifying critical uncertainties and key information gaps, with emphasis on providing a list of both short-term and long-term research needs. Those agencies and individuals that cannot support labor costs associated with attending the meeting will be provided with all workshop materials and will participate in summary documents resulting from the workshop.

Subtask 3b. Complete final report - The major deliverable for this project will be a comprehensive planning document. Section 1 of the report will include the conceptual framework for the project. Section 2 will include the project summaries compiled for Task 2. Section 3 will identify key linkages, interdependencies, critical uncertainties, and research needs consistent with an ecosystem approach to management of fall chinook salmon. Collectively, this information will provide fisheries managers with an key reference for regional decision-making. A draft report will be submitted to BPA for review and distribution by 1 August 2000. The final report will be submitted on 30 September 1998 or 30 days following receipt of review comments.

g. Facilities and equipment

No special facilities or equipment is required for this project. Workshops will be held at a centrally-located offsite facility. Principal investigators will use existing office facilities at Richland, Washington and Cook, Washington.

h. Budget

The total cost to complete this work in FY2000 is estimated to be $70,080. Approximately 53% is for personnel and fringe benefits. About 7% of the budget is for travel costs associated with interviews and meetings between principal investigators. Approximately 24% of the total budget provides for workshop meeting room expenses, and reimbursement of travel, lodging, and per diem costs (non-labor) for workshop participants. The percentage of the budget allocated to indirect costs is approximately 13%. Indirect costs include primarily organization overheads, which include costs for management, supervision, and administration of technical departments as well as costs for buildings and utilities, maintenance and operation of research equipment.

Section 9. Key personnel

DENNIS DAUBLE, Research Scientist 0.15 FTE

Education

B.S.	Fisheries	Oregon State University	1972
M.S.	Biology	Washington State University	1978
Ph.D.	Fisheries	Oregon State University	1988

Related Experience

Dr. Dauble is a staff scientist in the Ecology Group, Environmental Technology Division at Pacific Northwest National Laboratory. He manages a team of scientists involved in research for private companies and federal agencies, including the U.S. Department of Energy, U.S. Forest Service, BPA, and the U.S. Army Corps of Engineers. Dr. Dauble has extensive experience in activities related to assessing impacts from hydropower generation and flow regulation to aquatic ecosystems. He has been invovled in regional planning for fisheries issues and conducted research on Columbia River fish populations for BPA and other clients for over 20 years. Specific experience relevant to this project includes:

• Resource Planning - Dr. Dauble has extensive experience in regional planning forums, including several major workshops involving white sturgeon, smolt survival, and fish passage. He was project manager for studies involving the biological impacts of drawdown on anadromous fish survival and Snake River ecosystems. He provided assistance to the Snake River Recovery team on the passage and survival of Endangered Species Act salmon stocks. He participated in regional review of the Snake River drawdown as a member of the Technical Advisory Group and is an active participant in planning activities associated with analysis of the Surface Bypass and Collection and Reservoir Drawdown programs.

• Characterizing Habitat Requirements for Salmonids - Dr. Dauble has expertise in the use of aerial photography, underwater video systems, stream mapping, Global Positioning System (GPS), and Geographic Information System (GIS) techniques to characterize spawning habitat of fall chinook salmon and other salmonids..

• Yakima Fisheries Project - Dr. Dauble was project manager for National Environmental Policy Act (NEPA) compliance support to the Bonneville Power Administration and coordinated environmental review activities among the science and policy teams for the project.

• Ecological Monitoring Studies - Dr. Dauble has directed field studies dealing with the design of sampling procedures and collection techniques for environmental impact studies of the Columbia River aquatic community. Emphasis has been on ecological relationships of Columbia River fish, including life history aspects, population assessment, and migrational characteristics of both resident and anadramous fish species.

Relevant Publications

Dauble DD, RL Johnson, and A Garcia. 1998. Fall chinook salmon spawning in the tailraces of lower Snake River hydroelectric projects. Transactions of the American Fisheries Society. In Press.

Geist DR, and DD Dauble. 1998. Redd site selection and spawning habitat use by fall chinook salmon: the importance of geomorphic features in large rivers. Environmental Management 22:655-669.

Dauble DD, and DG Watson. 1997. Status of Fall Chinook Salmon Populations in the Mid-Columbia River, 1948-1992. North American Journal of Fisheries Management 17:283-300.

Johnson GE, and DD Dauble. 1995. Synthesis of existing physical and biological information relative to development of a prototype surface flow bypass system at Lower Granite Dam. Prepared for U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

Francfort JF, CF Cada, DD Dauble, RT Hunt, DW Jones, BB Rinehart, GL Sommers, and RJ Costello. 1994. Environmental mitigation at hydroelectric projects. Volume II. Benefits and costs of fish passage and protection. Prepared for the U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

Dauble DD, and RP Mueller. 1993. Factors affecting the survival of upstream migrant adult salmonids in the Columbia River Basin. Recovery issues for threatened and endangered Snake River salmon, Technical Report 9 of 11. Prepared for Bonneville Power Administration, Portland, Oregon.

Dauble DD, J Skalski, AE Giorgi, and A Hoffman. 1993. Evaluation and application of statistical methods for estimating smolt survival. Prepared for Bonneville Power Administration, Portland, Oregon.

Dauble DD, and DR Geist. 1992. Impacts of the Snake River drawdown experiment on fisheries resources in Little Goose and Lower Granite Reservoirs, 1992. PNL-8297. Prepared for the U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

Clune T, and DD Dauble. 1991. The Yakima/Klickitat fisheries project: a strategy for supplementation of anadromous salmonids. Fisheries 16(5):28-34.

Fickeisen DH, DA Neitzel, and DD Dauble. 1990. Hatchery effectiveness technical work group retreat proceedings. Prepared for Bonneville Power Administration, Portland, Oregon.

Dauble DD, TL Page, and RW Hanf, Jr. 1989. Spatial distribution of juvenile salmonids in the Hanford Reach, Columbia River. Fish. Bull. 87(4):775-790.

Fickeisen DH, DD Dauble, and DA Neitzel. 1989. Proceedings of the predator-prey modeling workshop. Friday Harbor, Washington. May 16-19, 1989. Prepared for Bonneville Power Administration, Portland, Oregon.

Anderson J, DD Dauble, and DA Neitzel. 1989. Smolt survival workshop. Proceedings of a workshop held at University of Washington Laboratory Friday Harbor, Washington. February 1-3, 1989. Prepared for Bonneville Power Administration, Portland, Oregon.

Fickeisen DH, DA Neitzel, and DD Dauble. 1983. White sturgeon research needs. Prepared for Bonneville Power Administration by Pacific Northwest Laboratory, Richland, Washington.

DENNIS W. RONDORF, Research Fishery Biologist 0.1 FTE

Education

B.S.	Wildlife Management	University of Minnesota	1972
M.S.	Oceanography/ Limnology	University of Wisconsin	1981

Related Experience

Mr. Rondorf serves as a research fishery biologist and section leader for the Anadromous Fish Ecology section at the Columbia River Research Laboratory**,** Biological Resources Division, U.S. Geological Survey. He is the principal investigator in a long-term, multi-agency project that addresses the life history and survival of fall chinook salmon in the Columbia River basin (9102900). Current areas of research include the behavior, ecology, and habitat use by chinook salmon in the Snake and Columbia rivers. Other research activities include studies on the distribution of smolts and the relation to gas supersaturation in the mainstem Columbia River and behavior of smolts to evaluate a prototype surface collector at Lower Granite Dam, Washington. Experience relevant to this project includes:

• Juvenile Salmon Research in the Columbia River Basin - Mr. Rondorf conducted research on juvenile salmon in the Columbia River Basin on a wide variety of issues including from migratory behavior, smolt physiology, and recovery planning. Results of his research have been used by regional resource managers to make significant policy decisions regarding flow management practices in the Columbia River Basin.

• Behavior and Habitat Studies - In recent years, Mr. Rondorf has lead research teams studying behavior and habitat using radio telemetry, Geographic Information Systems (GIS), Global Positioning Systems (GPS), remotely operated underwater vehicles (ROV), hydroacoustic fish stock assessment systems, and acoustic doppler current profilers (ADCP) as research tools.

Relevant Publications

Parsley MJ, DW Rondorf, and ME Hanks. 1998. Remote sensing of fish and their habitats. Proceedings of instream and environmental flows symposium-technology and policy issues. In Press. North American Lake Management Society and other. Denver, Colorado.

Rondorf DW, KF Tiffan, WP Connor, and HL Burge, eds. 1998. Identification of the spawning, rearing, and migratory requirements of fall chinook salmon in the Columbia River basin. 1996-97 Annual Report to Bonneville Power Administration, Portland, Oregon.

Adams NS, DW Rondorf, SD Evans, and JE Kelly. 1998. Effects of surgically and gastrically implanted radio transmitters on growth and feeding behavior of juvenile fall chinook salmon. Transactions of the American Fisheries Society 127:128-136.

Adams NS, DW Rondorf, SD Evans, JE Kelly, and RW Perry. 1998. Effects of surgically and gastrically implanted radio transmitters on swimming performance and predator avoidance of juvenile chinook salmon (Oncorhynchus tshawytscha). Canadian Journal of Fisheries and Aquatic Sciences 55:781-787.

Rondorf DW, GA Gray, and RB Fairley. 1990. Feeding ecology of subyearling chinook salmon in riverine and reservoir habitats of the Columbia River. Transactions of the American Fisheries Society 119:16-24.

Section 10. Information/technology transfer

This project will provide important benefits to researchers in the basin by interchange of information on new technologies and their application in the field and laboratory. More widespread use of innovative tools and software programs will improve the efficiency of data collection and advance our understanding of these important populations. Another important part of technology transfer for this project will be the reporting and presentations at regional forums.

Congratulations!